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THE NORTH AMERICAN SPECIES OF ELASMUS WESTWOOD (HYMENOPTERA, EULOPHIDAE)

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In this paper I give a revised key to the North American species of the genus *Elasmus* Westwood, with the description of one new species, and two new synonyms. I have also included a discussion of the reasons for considering the genus *Elasmus* to be the only presently known member of a subfamily Elasminae of the Eulophidae, rather than a distinct family Elasmidae.

A. A. Girault, in a private publication (1918), revised the North American species of *Elasmus* for the first time. The recent catalog of Nearctic Chalcidoidea by Peck (1963: 319–323) lists and gives complete bibliographic citations for all the previously described Nearctic species, with all the published host records. The types of all the described species of North American *Elasmus* are in the U. S. National Museum collection.

The genus *Elasmus* has long been thought to form the distinctive chalcidoid family Elasmidae, principally because *Elasmus* has enormous, flattened hind coxae. This difference makes it very easy to key it out as a family. At one time two other genera, *Euryischia* Riley, 1889, and *Myiocnema* Ashmead, 1900, were also placed in the family Elasmidae because they somewhat resembled *Elasmus* in habitus. They differ fundamentally from *Elasmus,* however, in thoracic structure and in having 5, rather than 4, tarsal segments. Ferrière (1947: 567) was of the opinion that the resemblance of *Euryischia* and *Myiocnema* to *Elasmus* was only convergent, and

Compere (1947: 381) almost simultaneously proposed removing them from the Elasmidae and placing them in close taxonomic association with *Aphelinus* Dalman, 1820. *Euryischia* and *Myiocnema* certainly resemble *Aphelinus* in basic thoracic structure, so their transfer to the Aphelininae (Aphelinidae of many authors) may be accepted without further question. This leaves only *Elasmus* in the Elasmidae.

But is Elasmidae itself a valid family? In a classification made on the basis of similarities, rather than differences, *Elasmus* would be placed in the family Eulophidae. *Elasmus* is distinguished, aside from its coxal character, by having 4-segmented tarsi, the axillae are produced anteriorly almost or quite as far as the bases of the tegulae, the scutellum bears 2 pairs of stout bristles, the female antenna has only 3 funicular segments, the male antenna has 4 funiculars (the basal 3 of which bear lateral branches), and the mandible has numerous denticles. These characters are all eulophid ones, and are, in fact, the diagnostic attributes used to recognize many genera as belonging to the Eulophidae. These characters certainly would refer *Elasmus* to the Eulophidae, and the peculiar shape of the hind coxae may be taken for what it undoubtedly is, an adaptive difference. This leaves no genera for the family Elasmidae. *Elasmus* may, however, be considered to comprise a subfamily Elasminae of the Eulophidae.

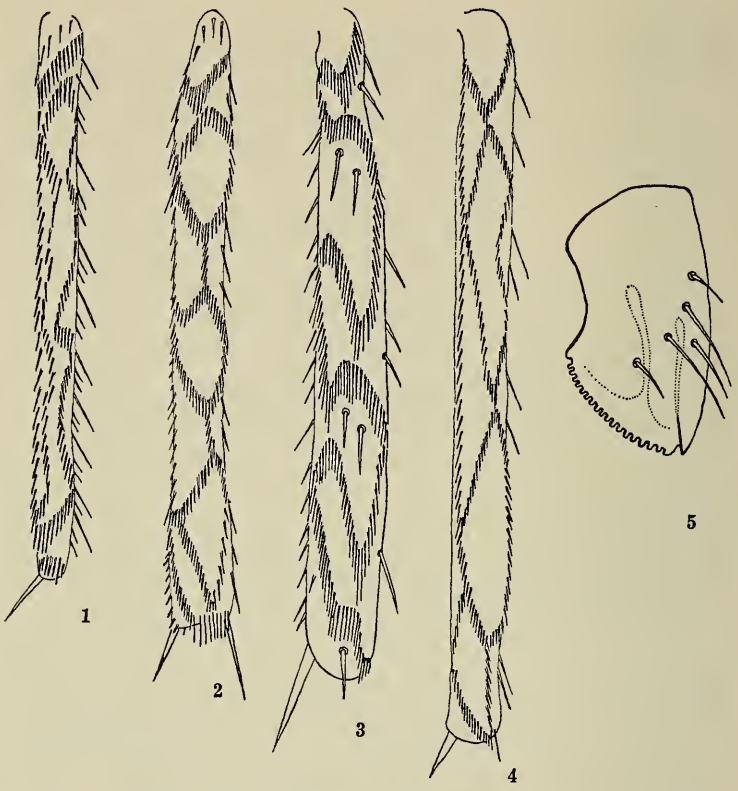
ELASMUS WESTWOOD

Key to Nearctic Species, Females

1. Scutellum clothed with numerous, closely set, short bristles in addition to 2 pairs of long bristles ..... *setosiscutellatus* Crawford
   Scutellum bearing only 2 pairs of bristles 2
2. Bristles on hind tibia arranged in more or less parallel, wavy, longitudinal lines, Fig. 1 3
   Bristles on hind tibia arranged to form diamond-shaped or elongate figures, Figs. 2, 3, 4 9
3. Apex of scutellum yellow 4
   Scutellum entirely black 5
4. Dorsal half of hind coxa black, ventral half yellow; apex of scutellum with a narrow yellow band ..... *albicoxa* Howard
   Hind coxa with a narrow black line on dorsal margin, otherwise yellow; apical half or more of scutellum yellow ..... *mordax* Girault

5. Entire hind coxa yellow ..... *zigzag* Girault
   Hind coxa half or entirely black 6
6. Abdomen mostly or entirely black, sometimes slightly lighter at base ..... *nigripes* Howard
   Abdomen marked with bright yellow, at least laterally 7
7. Hind coxa black on basal half, yellow apically ..... *tischeriae* Howard
   Hind coxa almost entirely or quite black 8
8. Front coxa entirely white or yellow ..... *borrowi* Girault
   Basal third to half of front coxa black, apically white or yellow ..... *marylandicus* Girault
9. Bristles on hind tibia enclosing 7 diamond-shaped areas, 3 on posterior margin, 4 laterally, Fig. 2 10
   Bristles on hind tibia enclosing 5 areas, 2 on posterior margin, 3 laterally, Figs. 3, 4 13
10. Ventral half of head yellow, dorsal half black, with a pair of minute yellow spots at eye margins opposite lateral ocelli ..... *albizziae*, new species
    Head entirely black 11
11. Postscutellum entirely white ..... *apanteli* Gahan
    Postscutellum partly or entirely dark brown or black 12
12. Abdomen and hind coxa entirely black, but abdomen may be slightly lighter at base dorsally ..... *atratus* Howard
    Abdomen and hind coxa partly bright tan or yellow ..... *meteori* Ashmead
13. Head yellow except for a small black area around ocelli; posterior margin of hind tibia with 2 diamond-shaped areas, each of which contains 2 bristles, Fig. 3 ..... *maculatus* Howard
    Head entirely black; enclosed areas on posterior margin of hind tibia elongate, Fig. 4 14
14. Abdomen bright orange or yellow except for a narrow band at base, 4 spots on dorsum, and the 2 apical terga, which are black ..... *floridensis* Girault
    Abdomen entirely black, or with 2 faint, transverse yellow or orange median dorsal bands ..... *pulex* Girault

The specific classification of *Elasmus* at present is based entirely on the females, because characters for the identification of most of the males have not been found. As Ferrière (1947: 568) remarked, "It is useless to try to determine a species of which one knows only the males." *Elasmus varius* Howard, 1885, and *E. pullatus* Howard, 1885, are, thus, unrecognizable, since they were described from the males only, and it has not been possible subsequently to associate females with them. It may be that *pullatus* and *atratus* Howard, 1897, are male and female of the same species. Not even a guess can be made at present about the identity of *varius*.



North American *Elasmus*. Figs. 1 to 4. Left hind tibia: 1, *albicoxa*; 2, *albizziae*; 3, *maculatus*; 4, *pulex*. Fig. 5, right mandible of *albizziae*.

Elasmus albizziae, new species

Female: Length 2.3–2.5 mm. Ventral half of head and a small spot at eye margin beside each lateral ocellus, antennal scape, sides of pronotum and anterolateral angles of mesonotum, tegulae, areas at lateral and apical margins of scutellum, and postscutellum, yellow; entire foreleg, midleg and hind leg beyond middle of coxa, white (although there is a minute black line on dorsal margin of mid and hind femora); abdomen mostly orange-tan or red-brown; dorsal half of head, antennal pedicel and flagellum, dorsal part of pronotum, mesonotum (except for anterior angles), meso- and metathoracic pleura, dorsal half of each hind coxa, base and variable areas on terga of abdomen, and apex of ovipositor sheaths, black. Wings hyaline, veins white. Head, body, and appendages clothed with dark brown or black setae and bristles.

Head slightly broader than high; frons with scattered umbilicate punctation, interstices faintly reticulated, almost smooth. Mandibles symmetrical, each with one small ventral denticle and a row of 17–19 minute dorsal denticles, Fig. 5. Ocellocular line as long as diameter of lateral ocellus. Relative lengths of parts of antenna: scape, 35; pedicel, 12; first funicular, 12; second, 13; third, 15; club, 30.

Bristle at posterolateral angle of pronotum as long as lateral margin of pronotum; 10 long bristles in median area of posterior margin of praescutum; tegula bearing 8 bristles; humeral plate of forewing with one long bristle. Forewing with submarginal vein ⅓ as long as marginal, postmarginal and stigmal each 1/12 as long as marginal. Four bristles at apex of fore coxa, 2 long and one shorter bristles at apex of mid coxa, and hind coxa with 3 anterior and one lateral apical bristles. Row of bristles along posterior margin of mid tibia straight (not sinuate near base, as in *maculatus*); mid femur with disc lacking bristles, these present only in dorsoapical area, and inner apical bristle short. Hind femur with apical bristles; hind tibia with 7 diamond-shaped areas, Fig. 2. Scutellum smooth and shining, bare except for 2 pairs of equally long, lateral bristles; postscutellum projecting only to middle of propodeum (not nearly reaching its posterior margin, as in *maculatus*).

Propodeal spiracle small, round, touching anterior propodeal margin. Abdomen slightly longer than head, thorax, and propodeum combined; first tergum twice as long as second; fifth tergum with a transverse, irregular row of bristles, sixth tergum with 3 transverse rows of shorter bristles, seventh tergum densely bristled. Apex of ovipositor sheaths slightly projecting beyond apex of abdomen.

Male: Unknown.

Holotype: USNM no. 67800.

Described from 12 ♀♀, all reared from *Homadaula albizziae* Clarke: Holotype, Marion Co., Ohio, 26 August 1964, J. W. Peacock; 9 paratypes, Champaign, Illinois, 2 August 1962, C. Scherer; 2 paratypes, Camden Co., New Jersey, 13 September 1960, L. G. Merrill. All specimens in USNM collection.

This species resembles *zehntneri* Ferrière, from India, Indonesia, and the Philippines, in having the funicular segments longer than wide, 7 diamond-shaped areas on the hind tibia, the entire foreleg white, the middle leg white with a narrow, black line on the dorsal margin of the femur, the hind leg white with the dorsal half of the coxa and the dorsal margin of the femur black, the mesoscutum black, the postscutellum white, and the abdomen mostly tan or red-brown. The two differ in that *albizziae* has the ventral half of the head yellow, rather than black, and the scutellum has the lateral and apical margins yellow, rather than black. *E. maculatus*, from Florida, the West Indies, and Brazil, has a color pattern somewhat like that of *albizziae*, but it has only 5 diamond-shaped areas on the hind tibia. Other differences between *albizziae* and *maculatus* are pointed out in the preceding description.

Elasmus albizziae may be one that has recently been introduced into the United States, possibly from the Oriental region. Although *Homadaula albizziae* Clarke has been a common pest on the leguminous tree *Albizzia julibrissin* (and to a lesser extent on related trees) since 1940, this *Elasmus* parasite was first found attacking it in September of 1960, in Camden Co., New Jersey. This parasite, to judge from the material of it I have received for identification since 1960, has subsequently spread westward to Illinois and southward as far as Maryland. Reared specimens have always come only from *Homadaula albizziae.*

This *Elasmus* is quite unlike any other North American species of the genus, but it resembles some of the described Oriental ones in color and structure. Its general habitus certainly suggests an Oriental *Elasmus,* but I have not been able to place it as a described Oriental species, or for that matter, as a described species from any other region of the world. Since a name is now needed for it here, I have described it.

Synonymy

Elasmus albicoxa Howard, 1885, U. S. Dep. Agr., Bur. Entomol. Bull. 5: 30. "♂" ♀.

Elasmus aspidiscae Girault, 1917, Insecu. Insci. Mens. 4: 117. ♀. New synonymy.

Howard described *E. albicoxa* from a broken specimen that lacked the abdomen and evidently also the antennae. He took it to be a male, but female specimens that agree with it have been taken subsequently. The male specimens that are associated with these females are quite different in color, being almost completely black, but they have the bristles on the hind tibia arranged in the same distinctive pattern as do the females.

E. aspidiscae, represented in the USNM collection by a single broken female, differs in no detectable way from *albicoxa.* Girault (1918: 2) said that his *aspidiscae* probably was the same as *albicoxa.*

Elasmus nigripes Howard, 1885, U. S. Dep. Agr., Bur. Entomol. Bull. 5: 30. ♂.

Elasmus missouriensis Girault, 1917, Insecu. Insci. Mens., 4: 117. ♀. New synonymy.

E. nigripes was originally described from a male, but subsequently it has been possible to find female specimens that were associated with males that are identical with the type of *nigripes. E. missouriensis* was described from a single female specimen that agrees in all particulars with the females that have been associated with the male of *nigripes.*

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